

***Agauopsis* (Acari, Halacaridae) of the Sevastopol area; supplementary notes on taxonomy and ecology**

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***Agauopsis* (Acari, Halacaridae) of the Sevastopol area; supplementary notes on taxonomy and ecology.** - Females, males and juveniles of *Agauopsis marinovi* Petrova, and the two closely related species *A. brevipalpus* (Trouessart) and *A. ibssi* sp. n. are described. *A. marinovi* is found in large numbers in deep layers of beaches with very coarse, unsorted sediment. *A. ibssi*, which is also psammophilous, is the dominating halacarid species in coarse subtidal sand. *A. brevipalpus* is an inhabitant of bushy, green, brown and red algae.

Key-words: Black Sea - Halacarid mites - *Agauopsis* - Descriptions.

INTRODUCTION

A first survey on halacarid mites of the Black Sea was published by CHICHKOFF (1907), and the first halacarid mites from the Sevastopol area were recorded by VIETS (1928). CHICHKOFF (1907) reported on twelve mites, collected in various depths along the coast of Bulgaria, and VIETS (1928) added four more species to the Black Sea fauna and presented descriptions of seven halacarid mites. In the following decades, new species, new records and supplementary data on biology and ecology of Black Sea halacarids were presented by MOTAS & SOAREC (1940), CASPERS (1951), MARINOV (1964), MAKKAVEREVA (1961, 1966a, b), BACESCU *et al.* (1963, 1967), KONNERTH-IONESCU (1968, 1970, 1971, 1972, 1973, 1979), PETROVA (1972a, b, 1976) and VOROBIEVA & YAROSHENKO (1982).

MATERIAL AND METHODS

Sandy deposits, algae and colonies of mussels and their epibionts were collected in May 1995 in the Sevastopol area, in the upper littoral zone by hand, in deeper water with a dredge. The halacarid mites were extracted by washing with fresh water through a 100 µm sieve. The meiofauna retained in the sieve was sorted under a binocular microscope. The mites were cleared in lactic acid and mounted in glycerine jelly.

Slides with type and voucher specimens are deposited in the Muséum d'histoire naturelle, Genève (MHNG), Naturhistorisches Museum Basel (NMB), Zoologisches Institut und Zoologisches Museum, Hamburg (ZIMH), and the author's collection.

Abbreviations used in the descriptions: AD, anterior dorsal plate; AE, anterior epimeral plate; ds, dorsal setae on idiosoma, ds-1, first pair of dorsal setae; GA, genitoanal plate; GO, genital opening; OC, ocular plate(s); P, palp, P-2, second palpal segment; pas, parambulacral setae; PD, posterior dorsal plate; PE, posterior epimeral plate; pgs, perigenital setae; sgs, subgenital setae; vl, ventrolateral; vm, ventromedial. Legs numbered I to IV, leg segments 1 to 6, i.e. trochanter, basifemur, telofemur, genu, tibia, and tarsus.

RESULTS

Three species of the genus *Agauopsis* were found in the Sevastopol area. The crevice system between bushy algae was inhabited by *A. brevipalpus*; sublittoral sandy deposits contained large numbers of *A. ibssi*, and deep layers of beaches harboured *A. marinovi*.

Agauopsis brevipalpus (Trouessart, 1889)

Figs 1-11

Agaue brevipalpus TROUESSART, 1889a: 1180, 1181; TROUESSART, 1889b: 181; TROUESSART & NEUMANN, 1901: 253, pl. 5, figs 2, 2a-2c.

not *Agaue brevipalpus*, LOHMANN, 1893: 22, 87; RAO & GANAPATI, 1968: (117).

not *Agauopsis brevipalpus brevipalpus*, NEWELL, 1947: 186-189, fig. 316.

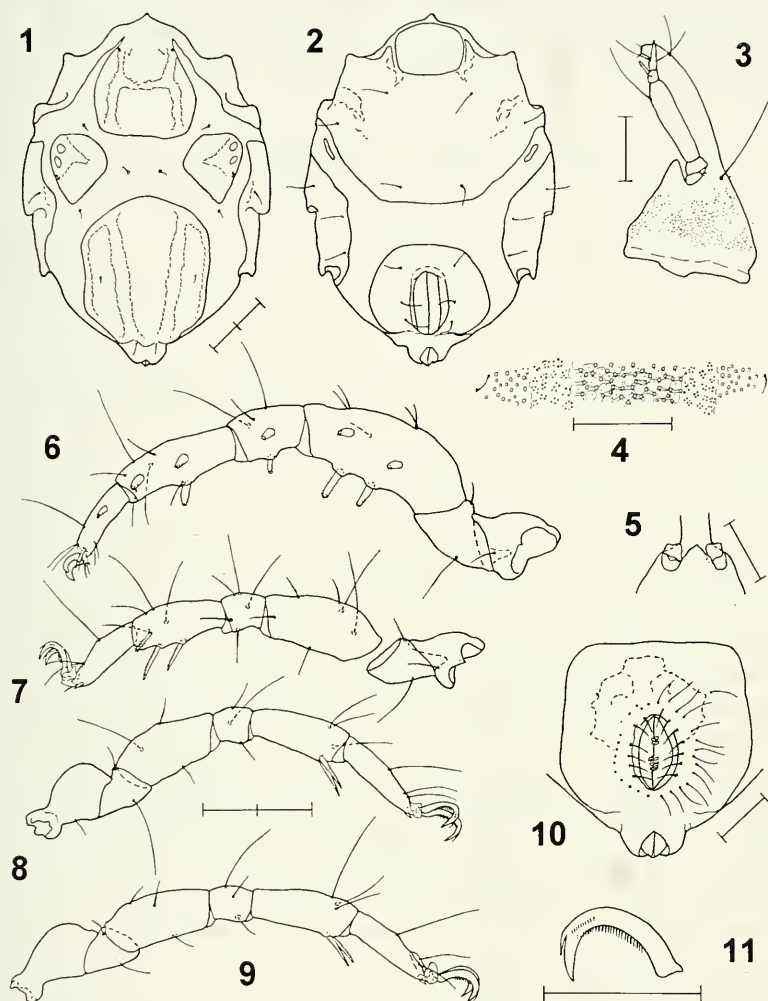
Agaue brevipalpus var. *pontica* CHICHKOFF, 1907: 258-259, plate 21, figs 1-7 (syn. n.).

Material Examined: One ♂, Crimea, Sevastopol, south-east coast, 2-4 cm high thickets with *Corallina* sp. (red algae), 0.3-0.5 m below water level, 11 May 1995 (MHNG). One ♀, 1 protonymph, same locality, 17 May 1995 (MHNG). One ♀, same locality, 17 May 1995 (NMB). One ♀, 1 ♂, same locality, 11 May 1995 (ZIMH A63/95). Four ♀, 2 ♂, 1 deutonymph, 2 protonymphs, same locality, 11 and 17 May 1995, and 2 ♀, 2 ♂, 1 deutonymph, 1 protonymph, same locality but from *Enteromorpha* and *Cladophora* spp. (green algae) and other small algae from rock pool, 2 and 11 May 1995 (author's collection). One ♀, 1 ♂, 1 deutonymph, 1 protonymph, mole of Sevastopol harbour, *Mytilus* sp. and algae from concrete tetrapods, 1-1.5 m depth, 3 May 1995; 3 ♀, 1 ♂ (author's collection), Omega Bay, *Cystoseira* sp. (brown algae) and other algae from pier, 0-2 m depth, 6 May 1995; 3 ♀, 1 ♂, 2 deutonymphs, 2 protonymphs (author's collection), Kazachya Bay, *Cladophora* sp. (green algae) and sediment, 10 m depth, 12 May 1995 (all in the author's collection).

Four ♀, 1 deutonymph, Crimea, Laspi, small thickets of *Corallina* sp., 10-15 cm below water level, 21 May 1995 (author's collection).

Holotype ♀, France, Atlantic coast, Le Croisic, from red algae (Muséum National d'Histoire Naturelle, Paris, Collection E. Trouessart Nr. 18C9).

Description (Black Sea material): ♀ - Length of idiosoma 470-542 µm. Integument of plates brownish; eye spots present beneath AD and OC. Raised porose areolae of dorsal plates with canaliculi of rosette pores piercing the integument; ostia lacking (Fig. 4). Remainder of plate with scattered delicate canaliculi, and surface of plate panelled due to cuticular droplets which are more or less fused, thus forming a reticulum. AD (Fig. 1) with small frontal process; posterior margin truncate or somewhat excavated. Plate with distinctly raised H-like costa; rosette pores reduced



FIGS 1-11

Agauopsis brevipalpus (Trouessart), 1, idiosoma, dorsum, ♀; 2, idiosoma, venter, ♀; 3, gnathosoma, lateral, ♀; 4, portion of PD between ds-5, ♀; 5, tectum, dorsal, ♂; 6, leg I, medial, ♀; 7, leg II, medial, ♀; 8, leg III, medial, ♀; 9, leg IV, medial, ♀; 10, genitoanal plate, ♂; 11, claw of tarsus III, ♂. (Each scale division = 50 µm)

to three to five canaliculi. Pair of gland pores level with insertion of leg I. OC with rounded angles. Plate with two corneae; porose areola triangular in outline. Lateral margin with gland pore and pore canaliculus. Anterior margin of PD rounded. Plate with pair of medial and lateral costae; costae of either side fused anteriorly. Medial costae four pycnic rosette pores wide, each rosette pore with three to five canaliculi.

Dorsal setae 10 μm long and rather stout, ds-1 inserted on AD slightly posterior level with pair of gland pores, setae ds-2, ds-3 and ds-4 within striated integument, anterior, between and posterior to OC respectively; ds-5 on PD within reticulate area between medial and lateral costae and on level with insertion of leg IV.

Ventral plates porose and faintly reticulate. AE (Fig. 2) wide; opening of epimeral pore slit-like; internal sacculus 10 μm long. Posterior margin of AE and anterior margin of GA truncate. GO large, distance from anterior margin of genital foramen to margin of GA 0.3 times length of foramen.

Gnathosoma slender, 1.9 longer than wide. Integument of gnathosomal base pierced by numerous canaliculi (Fig. 3). Rostrum about as long as gnathosomal base. Tectum (Fig. 5) triangular, extending to end of P-1. One pair of maxillary setae on gnathosomal base, one pair near apex of rostrum. Palps slender. P-2 4.0-4.4 times longer than high; with one dorsal seta. P-3 short, with dorsomedial bluntly ending, pectinate spine. P-4 somewhat longer than P-3, with two basal setae.

Integument of telofemora reticulate and with canaliculi. Telofemora I - IV 2.5, 2.2, 2.2 and 2.3 times longer than high, and 1.5, 1.3, 1.1 and 1.1 times longer than tibiae I - IV. Chaetotaxy of legs, from trochanter to tibia (setae in arabic and spines in roman numerals): leg I, 1, 2, 5+IV, 3+II, 6+III; leg II, 1, 2, 6, 5, 7; leg III, 1, 2, 3, 3, 5; leg IV, 0, 2, 3, 3, 5. Spines of leg I short, apically blunt and pectinate. I-3 (Fig. 6) with two ventral spines, basal one 26 μm , distal one 31 μm long; ventromedial spines both 25 μm long; I-4 with 17 μm long ventral and almost 25 μm long ventromedial spine; I-5 with one ventral and two ventromedial spines, each 25 μm long; tarsus I with 16 μm long ventromedial spine. Tibia II (Fig. 7) with three spine-like, bipectinate bristles; these bristles about as long as height of tibia II. Tibiae III (Fig. 8) and IV (Fig. 9) each with pair of spine-like pectinate bristles. Tip of tarsus I with pair of doubled pas, tip of tarsus II medially with spine-like, laterally with a long and a short seta-like pas, tarsi III and IV each with a single spine-like pas in lateral position.

Pair of claws on tarsus I smooth, distinctly shorter than those of succeeding legs; median claw stout, bidentate. Paired claws of tarsi II - IV long, with accessory process and pecten (Fig. 11). Numerous tines of pecten arranged along ventral margin of the claw (distinctly seen at 400x magnification). Median claw of tarsi II - IV reduced to a sclerite without denticles.

♂ - Length of idiosoma 440-469 μm . Dorsal aspect similar to that of female. GA (Fig. 10) with truncate anterior margin. GO large. Distance from anterior margin of GO to that of GA same as length of GO. Forty-two to sixty-seven pgs arranged in two rings around the GO, outer ring with 30-47 perigenital setae, inner ring with 12-18 setae. Pair of outlying setae on level with anterior setae of ring with perigenital setae. Genital sclerites with five pairs of spur-like sgs. Spermatopositor not reaching anterior margin of GA.

Juveniles - Dorsal plates more distinctly reticulated than in adults. Porose areolae not as raised as in adults but due to dense arrangement of canaliculi set off from remainder of plates. PD smaller than in adults. Deutonymphs 385-408 μm long. Genital plate rectangular, with broadly rounded angles, not fused with anal plate. Spines on leg I short. Genital plate with two pairs of minute subgenital setae close to

primordial genital opening and two pairs of perigenital setae. Protonymphs 290-334 μm long. Neither perigenital nor subgenital setae present on genital plate. Number of spines of leg I summarized in Table 1.

TABLE 1
Agauopsis brevipalpus, number of spines of leg I

	telofemur	genu	tibia	tarsus
Deutonymph	1vl, 2vm	1vl, 1vm	1vl, 2vm	1vm
Protonymph	1vl, 1vm	1vl, 1vm	1vl, 1vm	1vm

Variations - Out of 20 pairs of legs examined, one female has three spines on genu I.

Habitat: *Agauopsis brevipalpus* was commonly found, though never in large numbers, in samples with algae, from the upper littoral zone down to about 10 m depth, living amongst thickets of green, brown as well as red algae.

Remarks: With regard to the external morphological characters, the specimens from the Sevastopol area correspond with the holotype specimen from the French Atlantic coast.

CHICHKOFF (1907) described a 650-750 μm long variety, *Agauopsis brevipalpus* var. *pontica*. According to CHICHKOFF, *A. brevipalpus* var. *pontica* is larger than *A. brevipalpus brevipalpus*, and tibiae III and IV have two instead of three pectinate spines. When the characters are reevaluated, these differences do not exist. The somewhat depressed type of *A. brevipalpus* has an idiosomal length of 515 μm (530 μm according to TROUESSART, 1889b), its length to tip of rostrum is 625 μm . The length given by CHICHKOFF, which obviously includes the gnathosoma, is within the range of *A. brevipalpus*. The number of pectinate spines is the same.

The individuals described and illustrated by CHICHKOFF (1907) agree perfectly with the type specimen and the mites from the Sevastopol area, e.g., the dorsal plates have raised costae, the areas outside these costae are coarsely reticulated; the small triangular tectum of the gnathosoma extends to the end of P-I; the dorsal setae of the legs are rather long but the medial spines of leg I short; telofemora III and IV are almost twice as long as high; the claws of tarsi II and III have tines of claw pecten along their ventral flank. The ecological data, i.e. species wide-spread in the littoral but never occurring in large numbers (CHICHKOFF, 1907), also corresponds with that found to be true for *A. brevipalpus* in the Sevastopol area.

Distribution: Eastern North Atlantic, Mediterranean, Black Sea.

The records from the western Atlantic (LOHMANN, 1893; NEWELL, 1947), the Bay of Bengal (RAO & GANAPATI, 1968) and from off Sydney, Australia (LOHMANN, 1893) certainly are erroneous. A small collection of halacarids from the western Atlantic, from the Bermuda Islands and the Caribbean area (in the author's collection) includes two species of *Agauopsis* closely related but not conspecific with *A. brevipalpus*. A slide of Newell's halacarid collection (housed in the United States

National Museum of Natural History) from Soldiers Key, Florida, proved to contain not *A. brevipalpus* but a species most similar to *A. littoralis* Bartsch & Iliffe. In the Australian fauna, the genus *Agauopsis* is represented with several species, but according to present knowledge (OTTO, 1994, and unpublished data) none of them is conspecific with the eastern Atlantic *A. brevipalpus*.

***Agauopsis ibssi* sp. n.**

Figs 12-36

Agauopsis brevipalpus pontica, VIETS, 1928: 60-65, figs 31, 32.
not *Agauopsis brevipalpus pontica*, VIETS, 1940: 81, fig. 122.

Material Examined: Holotype ♀, paratype ♂, Crimea, Sevastopol, off Cape Chersonoc, coarse sediment, 10-12 m depth, 19 May 1995 (MHNG). Paratype ♀, same data as above (NMB). Paratype ♀ and male, same data as above (ZIMH A64/95). Eight paratype ♀, 5 ♂, 10 deutonymphs, 7 protonymphs, 4 larvae, same data as above (author's collection).

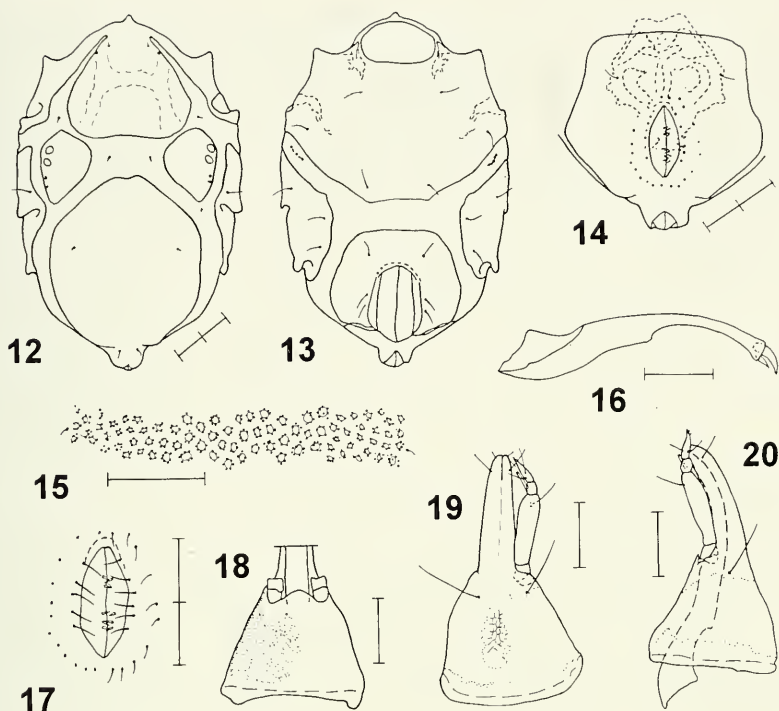
Three ♀, 4 ♂, Sevastopol, off Omega Bay, coarse sediment, 5-6 m depth, 6 May 1995 (author's collection).

Two ♂, Sevastopol, amphioxus sand, January 1912 (ZIMH, Collection Viets).

Description: ♀ - Idiosomal length 512-567 µm, holotype 570 µm long, 368 µm wide. Dorsal plates almost evenly ornamented with pycnic rosette pores. Each rosette pore with wide and shallow, pit-like ostium and, in deeper integumental layers, 6-10 canaliculi (Fig. 15). AD 195 µm long, 210 µm wide; with minute and blunt frontal process and very faintly developed H-like costa (Fig. 12). Small eye spot, 10-20 µm in diameter, beneath anterior portion of AD. First pair of gland pores in lateral margin of AD on level with insertion of leg I. OC 117 µm long, 90 µm wide, with rounded posterior angles. Lateral margin with two corneae, gland pore and pore canaliculus, and 22-27 µm long and 17 µm wide eye spot beneath corneae. PD 278 µm long, 247 µm wide. Anterior margin slightly concave as in holotype, but generally evenly rounded. Gland pores inconspicuous. Dorsal setae hardly more than 5-7 µm long. Setae ds-1 slightly anterior to pair of gland pores; ds-2 to ds-4 on minute sclerites within striated integument, ds-2 between AD and OC, ds-3 between OC and PD, ds-4 posterior to OC; ds-5 on PD anterior level with insertion of legs IV. Adanal setae in posterior margin of PD where PD and anal plate are fused.

Ventral plates with uniform ornamentation similar to that of dorsal plates. AE 222 µm long, 362 µm wide. Epimeral processes I and II lamella-like, coxal in origin. Epimeral pore with tube-like 12 µm long and 5 µm wide sacculus; opening to exterior through narrowed 10 µm wide slit. AE with three pairs of slender setae (Fig. 13). PE with a dorsal and three ventral setae. GA 212 µm long, 210 µm wide; wedges of striated integument between lateral portions of genital and anal plate. GO 120 µm long, 85 µm wide. Distance from anterior margin of GA to that of GO almost half length of GO. Three pairs of perigenital setae present, the two posterior pairs inserted adjacent to the GO. Subgenital setae lacking. Ovipositor in rest not extending beyond GO.

Gnathosoma 192 µm long, 105 µm wide. One pair of maxillary setae on gnathosomal base, one pair in apical fifth of rostrum. Tectum (Fig. 18) small, scale-like, extending to level with bases of P-1. Slender rostrum slightly shorter than gnathosomal base (Figs 19, 20). Palps slender. P-2 3.1-3.7 times longer than high. P-3

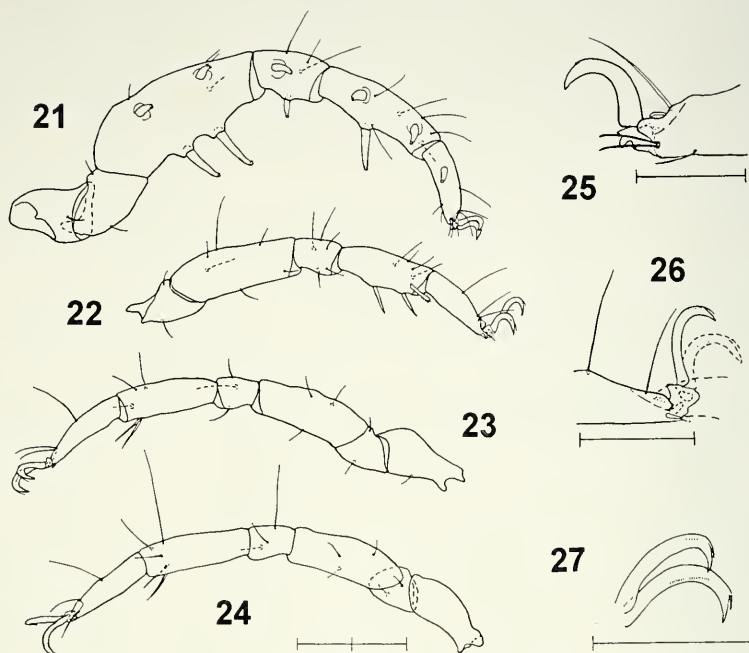


FIGS 12-20

Agauopsis ibssi sp. n., 12, idiosoma, dorsum, ♀; 13, idiosoma, venter, ♀; 14, genitoanal plate, ♂; 15, portion of PD between ds-5, ♀; 16, chelicera, medial, ♀; 17, genital opening, ♂; 18, gnathosomal base, dorsal, ♀; 19, gnathosoma, ventral, ♂ (porose areolae surrounded by stippled line); 20, gnathosoma, lateral, ♂ (porose areola surrounded by stippled line). (Each scale division = 50 µm)

with long, serrate and apically truncate spine; that spine slightly longer than length of P-3. P-4 with two setae in basal whorl and a setula and two spurs apically. Chelicera slender.

Leg I (Fig. 21) somewhat larger and distinctly stouter than legs II - IV (Figs 22-24). Telfemora slender, from I-3 to IV-3 2.4, 2.9, 2.8, and 2.8 times longer than high, and 1.4, 1.4, 1.1 and 1.0 times longer than their tibiae. Telfemora lack ventral lamellae and articular membranes; genua and tibiae lack articular membranes. Integument of lateral and dorsal flanks of telfemora, basifemora II - IV and trochanters III and IV pierced by canaliculi. Genua and tibiae with delicate canaliculi. Leg chaetotaxy, from trochanter to tibia (setae in arabic and spines in roman numerals): leg I, 1, 2, 4+IV, 3+II, 6+III; leg II, 1, 2, 6, 5, 7; leg III, 1, 2, 3, 3, 5; leg IV, 0, 2, 3, 3, 5. Dorsal setae slender. Telfemur I of holotype with four, otherwise often with five dorsal setae. Apical third of spines of leg I pectinate. Ventral spines of



FIGS 21-27

Agauopsis ibssi sp. n., 21, leg I, medial, ♀; 22, basifemur - tarsus II, medial, ♀; 23, leg III, medial, ♀; 24, leg IV, dorsomedial, ♀; 25, tip of tarsus I, lateral, ♀ (medial seta and claw omitted); 26, tip of tarsus II, medial, ♂ (medial setae and claw dashed); 27, claws of tarsus III, ♂. (Each scale division = 50 μ m)

telofemur 42 and 48 μ m, of genu 25 μ m and of tibia 42 μ m long, medial spines of I-3 36 and 40 μ m, of I-4 39 μ m, of I-5 42 and 36 μ m and of I-6 25 μ m long. Tibia II with three spine-like pectinate bristles; ventromedial bristle in its distal third widened and bipectinate. Tibiae III and IV with pair of spine-like, pointed and delicately pectinate bristles. Tarsus I distinctly shorter than tibia I. Medial membrane of claw fossa 2-3 μ m wide; slightly larger lateral membrane (Fig. 25) with small solenidion and internal famulus. Membranes of claw fossa of tarsi II - IV 10 μ m long, and 3-5 μ m high. Solenidion of tarsus II (Fig. 26) inserted on inner flank of medial membrane of claw fossa. Apex of tarsus I with pair of doubled pas, that of tarsus II laterally with a long and a short seta-like pas, medially with a spur-like pas; lateral pas of tarsi III and IV spur-like, medial pas lacking.

Paired claws of tarsus I somewhat shorter and median claw larger than claws of succeeding tarsi. Median claw of tarsus I bidentate. Paired claws with minute accessory process, claws on tarsi II - IV with very delicate pecten. Pecten (Fig. 27) on

outer flank of claw with 10 tines, pecten on inner flank of claw with 22 tines (tines generally not seen by 400x magnification).

♂ - Idiosomal length 515-569 μm . Dorsal aspect same as that of female. Relative to its length GA wider than that of female; GA of 533 μm long paratype 247 μm long, 247 μm wide. GO 90 μm long, 35 μm wide. Distance from anterior margin of GO to that of GA same as length of GO (Fig. 14). With 25-34 perigenital setae arranged around GO; of these, generally five to six pairs of setae adjacent to and 14-22 setae in a ring around GO. Pair of outlying perigenital setae anterior to that ring with setae. Genital sclerites (Fig. 17) with five pairs of short subgenital setae. Spermatopositor extending somewhat beyond anterior margin of GA.

Juveniles - Dorsal and ventral plates smaller than in adults (Figs 28 - 33). PD with distinctly demarcated costae in that the ostia of the rosette pores are smaller within the costae than in remainder of the plate, namely 2-3 μm wide within the costae versus 5 μm wide outside the costae.

Deutonymph 397-484 μm long. Almost quadrangular genital plate with two pairs of pgs. Two pairs of small sgs adjacent to 10 μm long primordial genital opening, and two pairs of internal genital acetabula beneath genital area. Telfemora and tibia I (Fig. 34) each with a ventral and two ventromedial spines, I-4 with long ventromedial and short ventral spine, tarsus I with ventromedial spine. Tibia II with three spine-like setae; tibiae III and IV with pair of spine-like setae.

Protonymph 309-337 μm long. PD with pair of medial and lateral costae. Genital plate with single pair of genital acetabula; pgs and sgs lacking. I-3, I-4 and I-5 each with a ventral and a ventromedial spine, I-6 with ventromedial spine (Fig. 35). Tibiae II - IV each with pair of ventral setae.

Larva 213-235 μm long. PD short, medial and lateral costae distinct due to their more intense porosity and smaller ostia. Integument outside costae with large ostia and almost inconspicuous canaliculi. Genital plate lacking. No spines on telfemur I; genu I and tibia I with pair of pectinate spines, tarsus I with ventromedial spine (Fig. 36). Tibiae II and III with pair of setae, those of III-5 tapering. Claws of tarsus I slender.

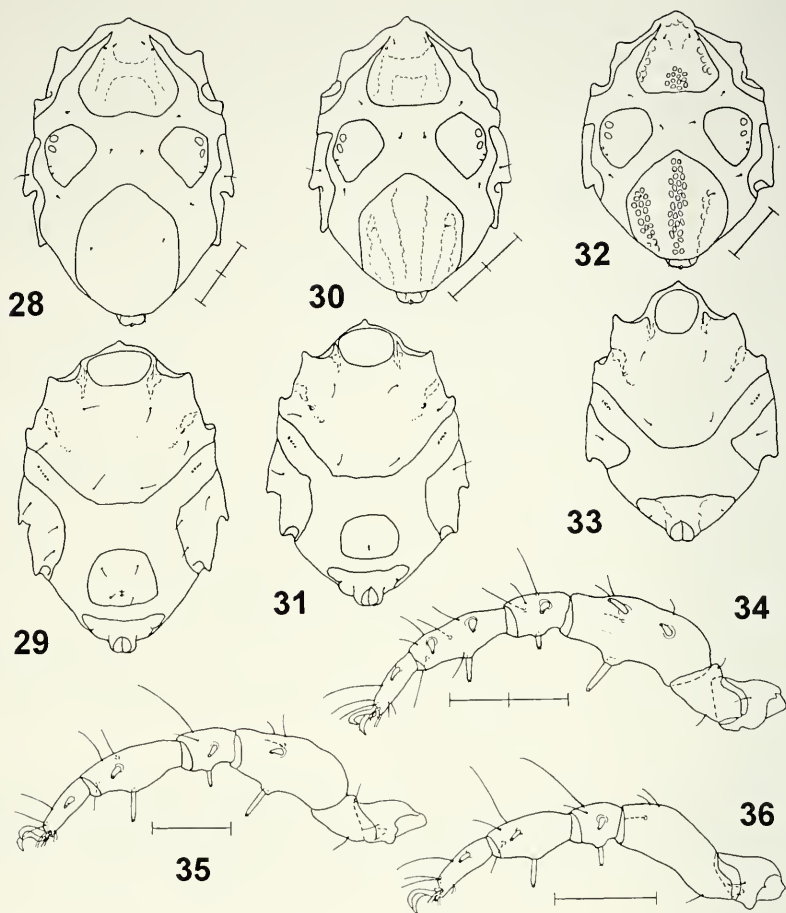
Variations - In one of 20 pairs of adult legs examined tibia III has three instead of two ventral bristles.

In one of the protonymphs the OC are fused with the PD.

Etymology: The species is named after the Institute of Biology of Southern Seas, IBSS, which was founded in 1871, 125 years ago.

Habitat: *Agauopsis ibssi* is an inhabitant of sublittoral sandy deposits. In the Sevastopol area the species was found in large numbers in coarse, unsorted amphioxus sand.

Remarks: *Agauopsis ibssi* differs from *A. brevipalpus* in that the PD is almost uniformly porose whereas the PD of *A. brevipalpus* has two pairs of costae; the dorsal setae are somewhat smaller and the ds-1 insert slightly anterior to the gland pores, the palps are 3.1-3.7 times longer than high, the tectum extends to level with bases of P-1, the telfemora III and IV are more slender than in *A. brevipalpus*, the tines of claw pecten are not recognizable at 400x magnification and the claws of tarsus I and the



FIGS 28-36

Agauopsis ibssi n. sp., 28, idiosoma, dorsum, deutonymph; 29, idiosoma, venter, deutonymph; 30, idiosoma, dorsum, protonymph; 31, idiosoma, venter, protonymph; 32, idiosoma, dorsum, larva; 33, idiosoma, venter, larva; 34, leg I, medial, deutonymph; 35, leg I, medial, protonymph; 36, leg I, medial, larva. (Each scale division = 50 μ m)

spines of leg I are longer than in *A. brevipalpus*. Males of *A. ibssi* have a lower number of perigenital setae than males of *A. brevipalpus*; the pair of outlying setae inserts anterior to the ring of perigenital setae and the spermatopositor extends beyond the anterior margin of the GA, whereas in males of *A. brevipalpus* the pair of outlying setae is on a level with the anterior setae of the ring of pgs and the spermatopositor does not reach the anterior margin of GA.

In juveniles the differences in the ornamentation of the dorsal plates are not as marked as in adults; still, juvenile *A. ibssi* can be identified on the basis of the more uniform porosity of the dorsal plates and longer spines on leg I.

The two species also differ in their habitats, *A. brevipalpus* lives amongst dense scrubs of algae whereas *A. ibssi* is psammophilous.

Representatives of *A. ibssi* were present in the material from the Sevastopol area studied by VIETS (1928). Viets identified the specimens from amphioxus sand as *A. brevipalpus pontica* (Chichkoff). The characters of the psammophilous mites from the Sevastopol area are not in accordance with those presented by CHICHKOFF (1907) for *A. brevipalpus* var. *pontica*. The dorsal plates of *A. ibssi* are almost evenly ornamented and the spines of leg I are long; in contrast, the PD of the specimen illustrated by Chichkoff has distinct longitudinal costae and the spines are shorter. The telofemora of *A. ibssi* are relative to their length longer than in *A. brevipalpus*.

Agauopsis ibssi and *A. brevipalpus* are very closely related and may be suspected of being ecotypes, the individuals from sublittoral sandy deposits having more weakly ornamented idiosomal plates, less pronounced costae, more delicate setae, and more slender legs than animals living in dense algal scrubs on exposed or semi-exposed shores. Within the genus *Agauopsis* as well as in other genera, e.g. *Copidognathus*, psammobiont species generally have evenly reticulated, porose or smooth idiosomal plates; they lack prominently raised costae with rosette pores, and in brackish-water *Copidognathus* the ornamentation is less pronounced, costae and rosette pores are never as prominent as in exclusively marine species. Sclerotization may be influenced to a minor extent by the physical and chemical conditions in the habitat, but ecotypes with markedly differing sclerotization dependant on the environmental parameters in the niche inhabited have as yet not been reported on. Accordingly, *A. ibssi* and *A. brevipalpus* are considered as distinct species.

Distribution: Black Sea.

Agauopsis marinovi Petrova, 1976

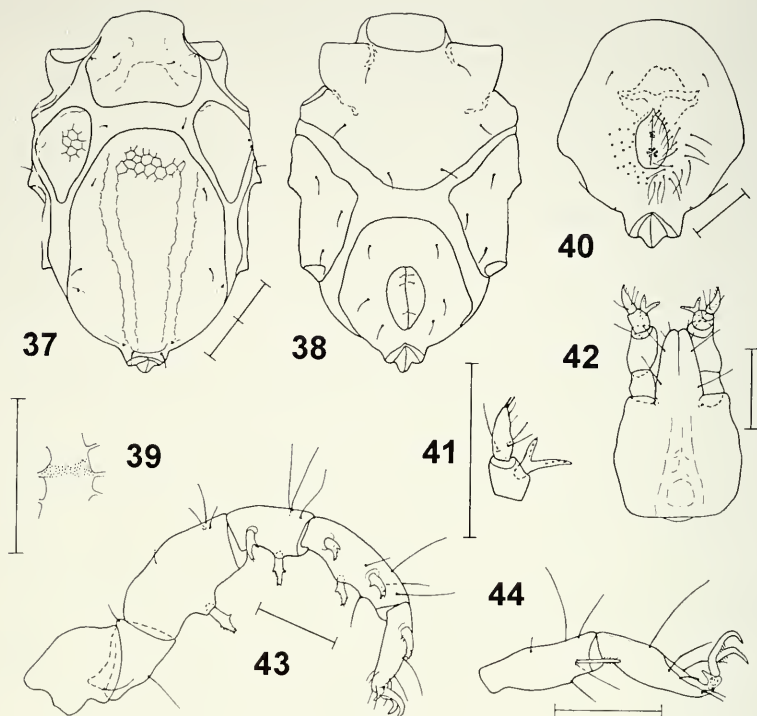
Figs 37-54

Agauopsis marinovi PETROVA, 1976: 67-70, fig 1.

Agauopsis aremorica Bartsch, 1984: 114-117, figs 1-17 (syn. n.)

Material Examined: One ♀, 1 ♂, 1 deutonymph, Crimea, Sevastopol, beach east of Omega, 0.5 m from water line toward land, 45 cm sediment depth, coarse, unsorted, very angular sediment, 24 May 1995 (MHNG); 1 ♀, collecting data as above (NMB); 1 ♀, collecting data as above (ZIMH A65/95); 7 ♀, 2 ♂, 6 deutonymphs, 7 protonymphs, 4 larvae, collecting data as above (author's collection). Four ♀, 1 ♂, 1 larva, same beach as above, 3 m from water line toward land, 45 cm sediment depth, coarse, unsorted sediment, 24 May 1995 (author's collection).

Description: ♀ - Length of idiosoma 323-408 µm. Porose areolae with dense, very delicate punctation but major part of dorsal plates reticulate, each mesh in turn subdivided by delicate cuticular bars. Anterior margin of AD studded with 5 µm long cuticular filaments (Fig. 37); porose areola arch-like. Area along anterolateral margin of OC porose; corneae and eye pigment lacking. Pair of divergent costae on PD 15-20 µm wide and delicately punctated (Fig. 39).



FIGS 37-44

Agauopsis marinovi Petrova, 37, idiosoma, dorsum, ♀; 38, idiosoma, venter, ♀; 39, portion of left costa of PD posterior to ds-4, ♀; 40, genitoanal plate, ♂; 41, P-3 and P-4, ♀; 42, gnathosoma, ventral, ♀; 43, leg I, medial, ♀; 44, tibia and tarsus leg II, medial, ♀. (Each scale division = 50 µm)

AE without epimeral pores (Fig. 38). GA with three, rarely four pgs on either side of GO. Oblong genital sclerites with two anterior and one posterior pair of delicate sgs.

Outline of gnathosoma as in male (Fig. 42). Tectum truncate. P-3 (Fig. 41) with stout and divaricate denticulate spine. P-4 with three short setae in basal whorl and two minute setulae and two spurs apically.

Leg chaetotaxy, from trochanter to tarsus (setae in arabic and spines in roman numerals; solenidion excluded): leg I, 1, 2, 4+I, 3+II, 5+III, 7+I; leg II, 1, 2, 4, 5, (5-)6, 6; leg III, 2, 2, 2(-3), 4, 5, 6; leg IV, 1, 2, 3, 3, 5, 5. Spines on leg I conspicuously serrate (Fig. 43), telofemur I with ventral spine; genu I with pair of spines; tibia I with one ventral and two ventromedial spines. Ventromedial seta of II-5 bipectinate and distinctly wider than ventrolateral one (Fig. 44). III-5 and IV-5 each with slender ventromedial and distinctly longer and wider ventrolateral seta. Tarsus I with three

dorsal setae, slender 9 μm long dorsolateral solenidion and flap-like membrane with famulus, strongly serrate ventromedial spine, pair of slender ventral setulae and pair of apical pas. Tarsus II with three dorsal setae, seta-like 8 μm long dorsomedial solenidion, single ventral setula and pair of pas. Tarsi III and IV with four and three dorsal setae respectively, each with the two distal setae being flattened and delicately plumose. Apex of tarsi III and IV with pair of seta-like pas.

Claws of tarsus I smooth, claws of succeeding tarsi longer but more slender. Pecten with 6-7 tines in basal half of claws.

♂ - Idiosomal length 353-396 μm . In dorsal aspect similar to female. Anterior margin of GA (Fig. 40) more rounded than in female; with pair of outlying setae and 44-50 pgs around the GO.

Juveniles - Idiosomal length of deutonymphs 282-328 μm . PD smaller and more slender than in adults, anteriorly rounded (Fig. 45). Genital plate and anal plate fused (Fig. 46). Genital plate with two pairs of pgs. Leg chaetotaxy similar to that of adults; leg I (Fig. 47) with same number of spines as adults have.

Idiosomal length of protonymph 205-254 μm . OC short, PD slender (Fig. 48). PE with a dorsal and a single ventral seta. Genital and anal plate fused (Fig. 49); perigenital setae lacking. Number of setae (arabic numerals) and spines (roman numerals) of leg I (Fig. 50), 1, 2, 3+I, 2+II, 3+II, 7+I. In one of the protonymphs both tibiae have two pairs of spines (Fig. 51).

Length of larva 157-192 μm . AE with two pairs of setae (Fig. 52) and a pair of epimeral pores (Fig. 53), each pore with 5 μm long internal tube. Genital plate lacking. Number of setae (arabic numerals) and spines (roman numerals) of trochanter, femur, genu, tibia and tarsus I (Fig. 54): 1, 4, 2+II, 3+II, 7+I.

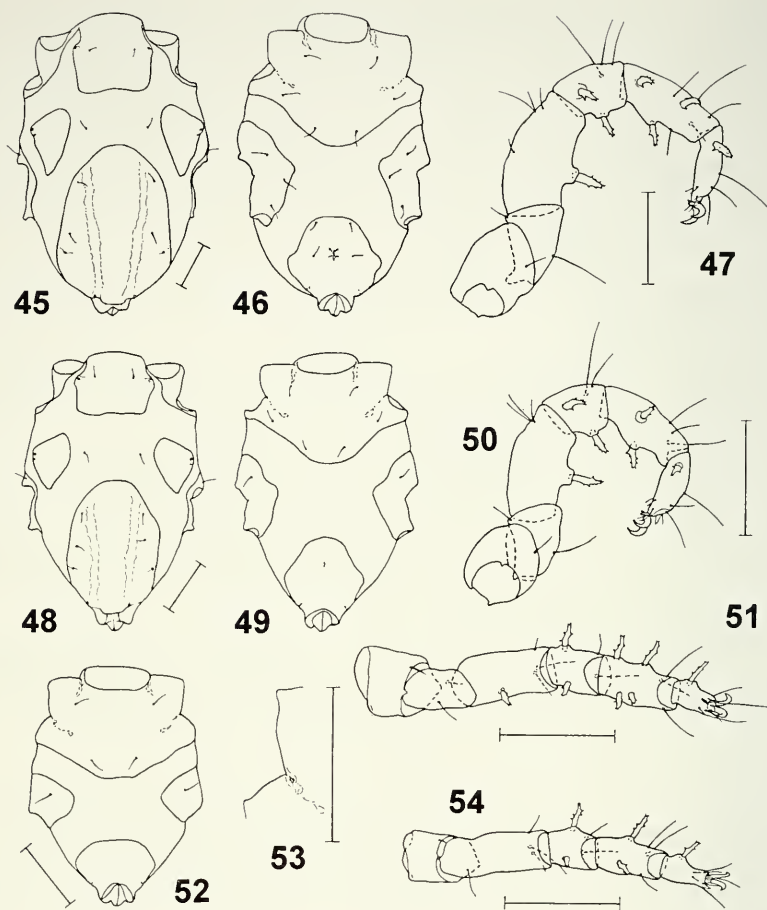
Habitat: *A. marinovi* was found in large numbers in 45 cm sediment depth, 0.5 to 3 m from the water edge toward the land, in a beach area regularly washed by waves. Their number rapidly decreased towards the permanently inundated beach area.

Remarks: The specimens from the Sevastopol area are considered as conspecific with *A. marinovi*, a species reported from the Bulgarian Black Sea coast. The ventromedial bristle of tibia II is widened and bipectinate, a character not mentioned in PETROVA (1976).

A. aremorica Bartsch, recorded from northern France (BARTSCH, 1984), has a similar bipectinate ventromedial bristle. In general facies, specimens from the eastern Atlantic coast agree perfectly with those from the Black Sea.

A. marinovi is easily separated from *A. brevipalpus* and *A. ibssi* on the basis of the divaricate spine on P-3 and the coarsely denticulate spines of leg I. In contrast to the two latter species, P-4 has three setae in the basal whorl, both pairs of maxillary setae insert on the rostrum; tarsi III and IV each have a pair of pas, and tarsus III has four dorsal setae; the deutonymphs and protonymphs have genital and anal plate fused. The pair of delicately porose costae of the PD resembles that often present in species of the genus *Halacarellus*.

Distribution: Spread in the Black Sea area. Present also in beaches of the eastern North Atlantic.



FIGS 45-54

Agauopsis marinovi Petrova, 45, idiosoma, dorsum, deutonymph; 46, idiosoma, venter, deutonymph; 47, leg I, medial, deutonymph; 48, idiosoma, dorsum, protonymph; 49, idiosoma, venter, protonymph; 50, leg I, medial, protonymph; 51, leg I, ventral, protonymph; 52, idiosoma, venter, larva; 53, portion of right AE with epimeral pore, larva; 54, leg I, ventral, larva. (Each scale division = 50 μ m)

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